Scarcity and consumer choice behavior

Verhallen, T.M.M.

Published in:
Journal of Economic Psychology

Publication date:
1982

CHAPTER 2.

SCARCITY OF GOODS: unavailability

2.1 Scarcity and Consumer choice behavior
Journal of Economic Psychology, 2, 1982, 299-322.

2.2 Unavailability and the evaluation of goods:
a behavioral economics approach
(submitted for publication).

Journal of Economic Psychology 2 (1982) 299–322
North-Holland Publishing Company

SCARCITY AND CONSUMER CHOICE BEHAVIOR

Theo M.M. VERHALLEN *

Tilburg University, The Netherlands

Received November 9, 1981; accepted April 20, 1982

Two experiments are performed to test hypotheses derived from commodity theory. Commodity theory promotes a psychological conceptualization of traditionally economic variables such as supply, demand and utility. The theory concerns itself mainly with the effect of restricted availability upon the valuation of communications, but in the present paper the effect of restricted availability and attainability on the preference for material goods (recipe books) is investigated.

The first experiment was designed to test the effect of degree of availability (low, middle or high) and cause of unavailability (accidental unavailability, unavailability due to popularity, unavailability due to limited supply and unavailability due to both limited supply and popularity) on the choice between three recipe books in a simulated product test. The results suggest that the theory is valid only for attractive products. For subjects who were not attracted to the product this relationship was reversed (they avoided choosing the scarce product), indicating the arousal of an 'altruism' motive in the experimental setting.

The second experiment was designed to test the effect of attainability (attainable, unattainable changed to attainable and unattainable) and cause of unattainability (accidental, popularity, limited supply and both limited supply and popularity) on the same kind of choice. The results again suggest that commodity theory is valid only for subjects attracted to the good, and only for the restricted attainability situation. For subjects not attracted to the product field no treatment effects were found. Commodity theory makes no clear prediction of the effects of unattainability, so reactance theory was used to predict the effects of this variable. The hypothesis that an unattainable good is valued more than an attainable good had to be rejected. A possible explanation based on the occurrence of frustration in this condition is discussed.

Introduction

Scarcity is a central concept in economics. It is in fact part of the definition of economics. The scarcity of means and goods sets the boundaries of economic science.

* Theo M.M. Verhallen is Assistant Professor at the Department of Economic Psychology of the Tilburg University, The Netherlands.

Mailing address: Th.M.M. Verhallen, Katholieke Hogeschool, G 711, Postbus 90153, 5000 LE Tilburg, The Netherlands.

0167-4870/82/0000–0000/$02.75

As we restrict ourselves here to the effects of scarcity on consumer behavior, the relevant question is how the concept of scarcity is handled in the microeconomic theory of demand. Although this is not explicitly stated, Slutsky and Hicks' (Hicks 1959) classical theory of consumer demand deals with both scarcity of means and scarcity of goods. Scarcity of means is translated into financial terms, as budget restriction; scarcity of goods is translated into the price of goods. Later (Becker 1965) the purely financial definition of scarcity of means has been broadened to include scarcity of time. However, no behavioral theory and little research (Lanzetta and Kanareff 1962) has been devoted to the ways consumers handle their scarce resources of money, time and effort.

Complementary to the scarcity of means is the scarcity of goods. In the traditional microeconomic theory of demand the scarcity of goods is translated into a financial price to be paid for a given good.

According to traditional economic theory, the confrontation of price and budget, on the one hand, with the preference curve for goods, on the other hand, results in an optimal price-quality (value) choice. Here the evaluation of product attributes is seen as independent of the financial sacrifice (price/budget ratio). Since Gabor and Granger (1966) we have known that the two aspects of product evaluation, price and quality, can no longer be seen as independent. If there is little product information to hand, then price is seen as an indicator of quality. This price-quality relationship has been demonstrated in several more recent studies (see Olson 1974, for an overview).

In recent economic literature the traditional economic treatment of scarcity and consumer demand is extended with the introduction of concepts such as 'social scarcity' and 'positional goods' (Hirsch 1976) and 'functional' and 'non-functional' demand (Leibenstein 1976). Hirsch distinguishes social scarcity from material scarcity. If the availability of a good depends only on technological and economic production factors, it is referred to as materially scarce. Goods which are available to each of us, but which cannot be made available to us all e.g. a high social position, an old masterpiece of art, are referred to as socially scarce goods.

The satisfaction derived from such (postional) goods will not only depend on their intrinsic characteristics but will also be influenced by the extensiveness of their use. Leibenstein argues for a reformulation of traditional microeconomic theory by including interdependencies be-

tween consumers, as reflected in bandwagon-, snob- and Veblen-effects, in his economic treatment of consumer demand. He recognized that in such effects a nonfunctional demand becomes overt. Nonfunctional demand is defined by Leibenstein as that portion of demand which results from factors other than the qualities inherent in the commodity. So both Hirsch and Leibenstein argue for an extension of the traditional economic theory of consumer demand. However, they do not go into the behavioral basis or underlying psychological mechanisms for explaining the effects of nonintrinsic product characteristics on consumer demand.

The commodity theory of Brock (1968) deals with this more extensively and deserves special attention.

The commodity theory of T.C. Brock

The theory argues for a psychological conceptualization of such traditional economic variables as supply, demand and utility. In this theory the valuation of a commodity is said to depend not just on intrinsic, functional product attributes, but also on supply and demand characteristics. A 'commodity' is defined as anything which has usefulness to the possessor and which can be conveyed from person to person (Brock 1968: 246). The main premise of the theory is that any commodity will be valued to the extent that it is unavailable. The more restricted and less available a good is, the more it will be valued.

This general premise is expressed in a number of more specific hypotheses. These hypotheses are placed into four categories, referring to scarcity, effort, restrictions and delay. All these hypotheses begin with 'a message will increase in effectiveness', because the theory focuses on information as the major commodity of interest.

The hypotheses with regard to scarcity are:

Hypothesis a: "a message will increase in effectiveness as the perceived number of co-recipients, relative to the total number of potential co-recipients, declines".

Hypothesis b: "a message will increase in effectiveness to the extent the recipient perceives that few other communicators exist who might have delivered the same message".

With regard to effort:

Hypothesis c: "a message will increase in effectiveness the greater the

degree of coercion upon the communicator needed to bring about disclosure".

Hypothesis d: "a message will increase in effectiveness the greater the perceived effort involved for the communicator, either to conceal the information or to transmit it".

Hypothesis e: "a message will increase in effectiveness the greater the magnitude of the recipient's effort to obtain the information or to understand (decode) it".

With regard to restriction:

Hypothesis f: "a message will increase in effectiveness in proportion to the amount of accompanying reasons opposing disclosure".

Hypothesis g: "a message will increase in effectiveness the greater the restrictions set by the communicator on further transmission".

Delay is seen as a further means of conveying unavailability:

Hypothesis h: "a message will increase in effectiveness the greater the delay by the communicator".

These hypotheses are discussed by Brock in the light of research collected by other investigators and of research carried out by himself and his associates. He finds support for hypotheses a, d and g. Other hypotheses receive only partial support and c very little (see Brock 1968: 252–270).

A few critical remarks must be made:

- In almost all reported studies the only commodity investigated was information. The only information provided to subjects was the limited availability of the message, holding the intrinsic properties of 'commodities' constant across conditions. So the question arises whether the commodity hypotheses can be transferred to material, tangible goods. The intrinsic properties of material goods might interfere with the value-increasing effects of the unavailability characteristics specified in the hypotheses.
- The dependent variable in almost all reported studies was evaluative. So the question remains whether the more positive verbal evaluations found are strong enough to influence choice behavior.

What little evidence does exist on the scarcity of material goods deserves special attention.

Scarcity research with regard to material goods

Research on commodity theory with regard to the effect of scarcity on the valuation of material goods is very limited. A literature review revealed only three experiments. Using nylon hosiery, Fromkin et al. (1971) investigated the influence of availability (high vs. low) and expectations of obtaining the product (possession vs. nonpossession) on price evaluation. Only availability revealed a trend in the expected direction ($p < 0.06$) on the valuation of scarce nylons. Less available nylons were rated as more expensive. Expected possession did not affect the price evaluation.

Worchel et al. (1975) investigated in a $(2 \times 2) \times 2$ design the effect of scarcity (abundant vs. scarce), change in scarcity (change from abundant to scarce, change from scarce to abundant, scarce no change and abundant no change) and the cause of scarcity (accidental vs. popularity) on the valuation of cookies. All their experimental treatments had a significant effect on liking and attraction ratings.

Scarce cookies, especially when becoming scarce due to popularity, were rated highest. In a further check upon the experimental effects Worchel et al. revealed an effect completely opposite to that hypothesized, for subjects showing suspicion with regard to the experimental manipulations. Subjects who were aware of the experimenters' intended manipulations reacted uncooperatively, that is exactly opposite to the overall trends described above.

A third study testing the commodity theory for material goods is reported by Piehl (1977), using textbooks. In a $2 \times 2 \times 2$ design, he investigated the effects on four evaluative dimensions of price level (high vs. low), the range of potential readers (small, only psychologists, vs. large, addressed to social scientists and others) and kind of book (a clinical vs. an experimental psychology book). For the clinical book only, a high price combined with a small range of potential readers had an effect on the wish to read and to possess the book. The other two evaluations (importance and interest ratings) were not affected by the experimental manipulations. The amount of variance explained by the scarcity treatment (size of potential readership) was very small (2%). The kind of book and the price level accounted for 39% and 12% of the variance respectively.

The experiments described here raise some important questions. The

first question is whether scarcity characteristics do affect the valuation of a material good strongly enough to have any effect when intrinsic product characteristics are prominent in the experimental setting. In the experiments of Fromkin et al. and Worchel et al. almost no (if any) information on intrinsic product characteristics was provided. Piehl provided more intrinsic product cues (a clinical vs. an experimental psychology book). Support for a 'commodity hypothesis' was found only for the clinical book, and then only weakly.

So a possible parallel with findings from price-quality research suggests itself. In that line of research it has been known that price serves as a quality indicator (Olson 1974) only when little intrinsic product information is provided. Note, however, that Piehl did not manipulate availability or attainability.

A second question already raised above, is whether the valuation change due to scarcity manipulations affects actual choice behavior.

The above questions were the basis for designing the two experiments reported here. A choice situation was created in which both intrinsic product information and 'scarcity' information were provided. The dependent variable in both experiments was the actual choice subjects made under different conditions. Another unresolved question is how the hypotheses formulated within Brock's commodity theory are to be translated for use with material goods. Brock is deliberately vague in this respect. As a matter of choice, as he puts it, his theoretical framework is restricted to communications (Brock 1968: 248). For communications the distinction between unavailable and unattainable may be less relevant. However, for material goods this difference may induce different psychological mechanisms. This distinction (first made by Fromkin in his experiment) seems necessary if further theoretical development is to be possible. Of the different reasons for unavailability, as reflected in the hypotheses derived in the commodity theory, market conditions, (social) demand and (limited) supply appear to be the most relevant starting points for experimental research. These considerations led me to explore, in the first experiment, the effect of unavailability and its possible demand and supply causes on choice behavior. The second experiment was designed to explore the effect of unattainability and its causes on choice behavior.

Experiment 1

Design

As a cover for this experiment, a product test situation was used. Subjects had to choose one from three recipe books. Information about the content of the books was given, as well as information about the availability of the books in the choice situation. The three levels of availability (high: 30 copies available; medium: 16 copies available; and low: 6 copies available) were varied across the three books. In the limited availability conditions, one of the following four reasons for limited availability was given: accidental circumstances, popularity of the books in earlier products tests, limited supply, or both popularity and limited supply.

The design may be summarized as a nested $(3 \times 3) \times 4$ factorial design. It includes: 3 recipe books, 3 levels of availability (6, 16 and 30 copies) and 4 causes for the limited availability (accident, popularity, limited supply, and both popularity plus limited supply). This resulted in the full rank design per (four) treatment (accident, popularity, etc.) shown in table 1.

Method

Subjects

Each of the $6 \times 4 = 24$ cells of the design contained at least 4 subjects. The subjects were 111 respondents from the Tilburg area selected randomly from the telephone directory. Female subjects were used for practical rather than theoretical reasons. Student subjects could not be used as the cover story for the scarcity experiments (product tests) caused suspicion among them in a pilot study. They did not consider this kind of research to be 'scientific' enough to be

Table 1

Books	N-copies (six availability combinations)					
- P 1	6	6	16	16	30	30
- P 2	16	30	6	30	6	16
- P 3	30	16	30	6	16	6

performed at a psychological laboratory, and so they guessed that it must have some other purpose. So, to prevent the reactance effect reported by Worchel et al. (1975), housewives were used as subjects in the experiments. In the debriefing, 3 subjects (all familiar with psychological research) showed suspicion and were excluded from the analysis. One other subject already possessed one of the recipe books and was also excluded. So the number of subjects for this experiment was 107.

Procedure

The subjects entered the experiment in groups of 3 to 5, usually 4. As in the advance information they had received, they were told that this was a research project on how to perform product tests. They would be able to keep the products they chose. They were also told that product tests of this kind were held on a regular basis, and they were therefore asked to indicate their interest in 18 different kind of products in case they might cooperate in future product tests.

The subjects were then led into the experimental laboratory. In this laboratory 6 cubicles were available, one for each subject. They were informed that this was in order that they should not influence one another, when making their choices among the products to be displayed before them. The standard instructions were then given to them via earphones and using TV-screens in front of each cubicle. The subjects were instructed to choose between 18 recipe books displayed before them on a table. They could see that all the books were from the same editorial series. They were told that there would be three parts to this particular product test. In each they would have to evaluate and choose between three books chosen at random from the 18. At the end the experimenter would choose, at random, one of the three choice forms the subject had filled out. The subject would receive the book given as first choice on that form. It was emphasized that they should not see each other as competing, as they each would receive different choice forms. They were then given the first choice form on which three books were described.

The information was taken from the back cover of the book, discarding the information referring to popularity, uniqueness, etc. Besides this 'factual' information the subjects received information about the evaluations and choices in previous product tests. They were told that this was to provide them with some more of the 'real world' kind of information they would receive in bookshops or from friends.

The first choice between three recipe books was the same for all subjects. The information given consisted of the content of the books, the popularity of the three books in a previous product test (about equally popular), the number of copies available at the beginning of the experiment (abundant, about 30 copies), and the real world availability (available in the average bookshop). In the second choice, the experimental one, the information about availability within the experiment was varied between the three books. The number of copies available was said to be 6, 16 or 30. The reasons given for these differences in available numbers were varied between subjects:

Condition 1 – by accident: the subjects were told that, by accident, the publisher had sent unequal numbers of the three books;

Condition 2 – popularity: here it was said that these books had been used in a previous product test which started with equal numbers (35 copies of each book), but that one book was chosen 29 times so 6 copies of that book remained, but that the others had been less popular, so that more copies of them remained for this product test;

Condition 3 – limited supply: the different numbers of copies available were attributed to the size of the edition. One book had a very limited edition so that the publisher could spare only six copies. The second book had a less limited but still restricted edition, so the publisher could spare only 16 copies. The third book had a large edition so a sufficient number (30 copies) was available for this test;

Condition 4 – popularity plus limited supply: the subjects were provided with the information from condition 2 and 3 combined. Thus both limited supply and popularity was said to cause the restricted availability of the books.

The subjects were assigned randomly to the conditions. After having received the information on the three books the subjects had to rank-order the books according to their preference.

In the debriefing the subjects filled in a short questionnaire concerning:

- possession of the books (one of the subjects already owned one of the 'experimental' recipe books and was therefore excluded from the analysis);
- understanding of the procedure, instructions, etc.;
- and a (leading) question about the correctness of the availability information. Here three subjects showed suspicion and were excluded from the analysis.

The chosen books were mailed to them later.

Hypotheses

The following hypotheses were tested:

(1) There is no difference in preference for the three recipe books P1 = P2 = P3.
(2) There is a difference in (recipe book) preference for the three availability levels: 6 > 16 > 30.
(3) There is a difference between the availability causes (accidental, popularity, limited supply and popularity plus limited supply) in the effect of availability levels on preferences. Therefore the treatments popularity, limited supply and limited supply plus popularity are tested against the 'neutral' condition, 'accidental' availability.

Results

The book preference rankorders were analyzed using a conjoint measurement algorithm TRIRANK [1], which determines the utility of each level of each factor in the design. A χ^2-test is then used to test the differences between observed and expected rankorders. The procedure can be compared to an analysis of variance in which the variances attributed to different factors are computed first and then the significance of differences between factor levels is tested using the *F*-distribution.

The analyses have been done with conventional analyses of variance as well as with conjoint measurement. As no substantial differences between these analysis techniques were found, only the results from the more appropriate conjoint measurement analyses are provided. The utility scores obtained from TRIRANK for each of the factor levels are presented in table 2. Since, in conjoint measurement analysis, the utilities obtained can only be interpreted relative to each other, the utility of one level of each factor is set, arbitrarily, at zero.

As shown in table 2, none of the experimental treatments produced a significant effect on the preference rankings of the recipe books.

Several possible explanations for these findings can be suggested. First, the operationalization may have failed to produce an impression of unavailability in the experimental subjects. But as all but the three

[1] The author wishes to thank Dr M. Croon, Tilburg University, for developing the computer program TRIRANK to test the effect of treatments in a full rank design on rank data

Table 2
The effect of limited availability and cause of limited availability on product preference

Factor	Factor level	Utility score	χ^2 with $df = 2$	Significance
Product	P 1	0		
	P 2	−0 36	4 65	*n s*
	P 3	−0 04		
Limited availability cause				
Accidental	6 copies	−0 06		
	16	0	0 05	*n s*
	30	−0 07		
Popularity	6 copies	0 48		
	16	0	2 22	*n s*
	30	0 03		
Limited supply	6 copies	−0 38		
	16	0	0 85	*n s*
	30	−0 20		
Popularity plus	6 copies	−0 26		
limited supply	16	0	0 73	*n s*
	30	0 02		

excluded subjects stated explicitly that they believed in the information provided, this possibility can be excluded.

A second possibility is that commodity theory holds only in situations where no other information about the 'commodities' is given. As this is the major difference between the present experiment and the ones discussed above, this hypothesis seems attractive. It might well be that unavailability only affects the valuation and preference for goods if few or no other information cues are given, as is the case for the price–quality relationship. A third reason could lie in the material used in this experiment, recipe books. A commodity is defined as anything which has usefulness. It is possible that some of our subjects did not in fact use recipe books, so that this condition was not fulfilled. A recipe book was one of the 18 products the subjects rated on a 7-point scale (very attractive – very unattractive) before entering the experiment, and these ratings were used to check upon this last possibility. On the basis of these ratings the subjects were subdivided into an 'attractive product group' ($N = 56$) who had rated recipe books as attractive, and a 'non-attractive product group' ($N = 51$) who had rated recipe books as

neutral or unattractive. The preference rankings were then analyzed separately for the two groups.

The results for the attractive product group are presented in table 3. For this group the availability treatments had a significant effect on product preference for all but the accidental unavailability condition. Two hypotheses with regard to within-treatment difference were tested. The χ^2-values, denoted with (a) in table 3, refer to the overall difference within the condition. The χ^2's denoted with (b) refer to the difference between the highest unavailability level (6 copies) and the two lower unavailability levels (16 and 30) taken together. A higher significance level was obtained with the latter test, indicating the exceptional attractiveness conferred by unavailability at the 6 copies availability level. Note that even though there was a significant effect of the product itself on preference, the hypotheses derived from commodity theory were still confirmed. Only in the accidental availability condition was the hypothesis not confirmed.

Table 3
The effect of limited availability and cause of limited availability on the preference for *attractive* products. ($N = 56$)

Factor	Factor level	Utility score	χ^2 with $df = 2$	Significance
Product	P 1	0		
	P 2	−0.73	11.1	$p < 0.01$
	P 3	−0.05		
Limited availability cause:				
Accidental	6 copies	0.81		
	16	0	3.66 [a]	*n.s.*
	30	0.59	3.00 [b]	*n.s.*
Popularity	6 copies	1.51		
	16	0	6.55 [a]	$p < 0.05$
	30	0.27	10.50 [b]	$p < 0.01$
Limited supply	6 copies	0.82		
	16	0	6.42 [a]	$p < 0.05$
	30	−0.35	9.63 [b]	$p < 0.01$
Popularity plus limited supply	6 copies	0.86		
	16	0	3.45 [a]	*n.s.*
	30	−0.05	6.01 [b]	$p < 0.05$

[a] χ^2 when testing overall availability within treatment.
[b] χ^2 when testing availability level 6 against the others.

This might indicate that unavailability affects product preference only when it can be attributed to either social demand (popularity) or limited supply. The indicative difference between the medium availability (16 copies) and the 'extreme' availabilities (6 and 30 copies): $\chi^2 = 4.8$, $df = 2$, $p < 0.10$ seem to point in that direction. So the number of 6 copies may have been interpreted by the subjects as not truly accidental but due to limited supply and 30 copies 'accidentally' available may have been taken to mean 'it must be popular'. To test this more directly, the conditions in which the degree of availability was attributed to market conditions were tested against the accidental condition.

Table 4 shows that the accidental condition differed significantly from the others. This confirms that unavailability affects product preference only when it is attributed to market conditions.

The same analysis was performed for the subjects who rated recipe books as unattractive. The results show a pattern completely opposite to what would be expected from commodity theory. The most unavailable book (level 6) received the *lowest* utility value. When the effect of this availability level was tested against the other two levels (denoted (b) in table 5) this difference was significant for all but the accidental condition.

A plausible explanation, not testable in the present data, was offered by the subjects themselves in the debriefing phase of the experiment. When asked whether they felt that they were influenced by the availability information some subjects immediately said 'yes'. They had not chosen the most scarce book, so as to leave it to the others. This effect may have been due to the experimental situation. Most usually, the subjects were performing the 'product test' with three others. They had been introduced to one another before the experiment started. (This was to make them feel more at home in what might have been a

Table 4
The effect of different causes of limited availability on the preference for *attractive* products ($N = 56$)

Limited availability causes	χ^2	*df*	Significance
Popularity vs accidental	6.62	2	$p < 0.05$
Limited supply vs. accidental	7 47	2	$p < 0 05$
Popularity plus limited supply vs accidental	4 73	2	$p < 0 10$

Table 5
The effect of limited availability and cause of limited availability on the preference for *non-attractive* products ($N = 51$)

Factor	Factor level	Utility score	χ^2 with $df = 2$	Significance
Product	P 1	0		
	P 2	0 39	5 35	*n s*
	P 3	−0 04		
Limited availability cause				
Accidental	6 copies	−0 94		
	16	0	4 12 [a)]	*n s*
	30	−0 73	3 57 [b)]	*n s*
Popularity	6 copies	−1 03		
	16	0	4 60 [a)]	$p < 0$ 10
	30	−0.24	6 07 [b)]	$p < 0$ 05
Limited supply	6 copies	−1 32		
	16	0	7 14 [a)]	$p < 0$ 05
	30	0 17	10 10 [b)]	$p < 0$ 01
Popularity plus limited supply	6 copies	−1 26		
	16	0	6 80 [a)]	$p < 0$ 05
	30	0 10	9 20 [b)]	$p < 0$ 01

[a)] χ^2 when testing overall availability within treatments
[b)] χ^2 when testing availability level 6 against the others

threatening situation for them.) They might have anticipated having to confront the other subjects after finishing the experiments. This interesting result may indicate that unavailability, especially when due to scarcity, arouses a social motive when the situation involves the presence of others, and a follow-up experiment has been designed to test this hypothesis more explicitly.

Summarizing the findings: the first experiment indicates that the commodity theory is applicable to tangible products, provided that subjects are attracted to the product field. For such subjects a preference increase for books of limited availability is found, when the limited availability is due to market circumstances (popularity, limited supply or both popularity and limited supply). The expected increase in preference due to limited availability was found to be reversed for subjects who were not attracted to the product field. This indicates that other motives ('altruism') may be aroused by scarcity in subjects who are not interested in the product.

Experiment 2

Design

As in experiment 1, a product test situation was simulated. The same subjects had to choose between three recipe books. Three levels of attainability (attainable, unattainable, unattainable changed to attainable) were varied across the three books. As in experiment 1, one of the following four reasons was given for the non-attainability: accidental circumstances, popularity, limited supply, both popularity and limited supply. These treatments yield a nested $(3 \times 3) \times 4$ factorial design. For each of the four attainability causes six attainability × book combinations are created as shown in table 6. Thus in each cell of the design two of the books are attainable and one of the books is either non-attainable or non-attainable changed to attainable.

Method

Subjects

Each of the $6 \times 4 = 24$ cells of the design contained a minimum of 4 subjects. In practice we ended up with 111 usable subjects spread evenly over the treatments (the same three subjects as in experiment 1 were excluded).

Not knowing beforehand how many subjects would be suspicious, and so have to be excluded, we 'oversampled'. In total 132 subjects participated in these and a following experiment (not reported here), in which the same subjects again had to choose from three different recipe books.

A restriction was imposed in the second experiment to the effect that

Table 6

Books	Six attainability combinations					
- B1	N [a]	A	A	NA [c]	A	A
- B2	A [b]	N	A	A	NA	A
- B3	A	A	N	A	A	NA

[a] N = non-attainable
[b] A = attainable
[c] NA = non-attainable changed to attainable

no subject could receive a treatment similar to her treatment in experiment 1. So for example all subjects receiving the treatment 'Popularity plus limited supply' in the first experiment were assigned to the 'accident' treatment in the second experiment. Similarly, all subjects from the treatment 'Popularity plus limited supply' in experiment 2 were recruited from the 'accident' treatment in the first experiment.

Procedure

The general procedure for this experiment was identical to the one used in the first experiment. Besides the information about the content of the recipe books information was provided now concerning the attainability of the books. The subjects were instructed that two of the three books (completely counterbalanced in the design) were completely attainable. More than sufficient copies were available. All the subjects were instructed on the choice form that regrettably one of the books was not there. The causes for this were similar to those used in experiment one:

- *Accidental:* they had not arrived in time from the publishing house;
- *Popularity:* the subjects participating in the product tests on previous days had chosen them far more often than expected. We were temporarily sold out;
- *Limited supply:* the size of the edition of the books was so small that the publisher could not spare more than the one copy that they saw before them on the table. They could not have that one;
- *Popularity plus limited supply:* both the foregoing attributions taken together. The book has been chosen far more often than expected and because of the small size of the edition the publisher could not spare more copies.

Half of the subjects from each treatment received a piece of paper attached to the choice form. It said that the originally unattainable recipe book was now, contrary to the information given above, attainable. Copies had arrived that morning. The publisher had (agreed to) send sufficient new ones. As the always unattainable book could not be chosen by the subject, the subject was instructed to evaluate it relative to the others. For these conditions, therefore, a preference ranking for the three books was obtained.

Hypotheses

Unattainability changed to attainability

Although the commodity theory is not very specific with regard to attainability, the effort hypotheses derived from the theory can be interpreted as: 'the harder to obtain a good the more it will be valued'.

Based on this interpretation we expect the books that were at first unattainable but later became attainable to be perceived by the subjects in the experiment as harder to obtain, and hence to be preferred to books that were always attainable. We especially expect this to happen in the two 'limited supply' conditions. Thus the first hypothesis is:

H1: The books that were unattainable at first will be preferred to the always attainable books, especially for the two 'limited supply' conditions.

However, as this hypothesis is based upon our interpretation of commodity theory, we turn to the 'gain-loss' notion of interpersonal attractiveness, introduced by Aronson and Linder (1965), to support this interpretation. They found that a change in the behavior of a person from cold to warm led to a higher attractiveness rating for that person than consistently warm behavior. This gain in attractiveness rating, as well as a loss in attractiveness rating for persons changing in behavior from warm to cold as compared with consistently cold, has been discussed more extensively by Clore et al. (1975). In this gain-loss model of interpersonal attraction, we find support for the expectation that subjects in our choice situation will increase their valuation (a 'gain' effect) of an originally unattainable book when becoming attainable.

Worchel et al. (1975), when discussing their results, argue that as the commodity theory does not incorporate a behavioral mechanism as to why scarcity arouses a value increase, a reactance mechanism could be at work. The reactance theory (Brehm 1966) hypothesizes that when a subject's freedom to have a particular item is threatened or eliminated, that item increases in value and attractiveness. This increase in value is the result of subjects' being motivated to restore their freedom to have the item. Worchel et al. found significant differences between their 'scarcity change' and 'scarcity no change' conditions. When the number of cookies changed from scarce to abundant they were valued less than when always abundant.

When cookies changed from being abundant to being scarce they were valued more highly than when always scarce. The reactance-theory explanation given by Worchel et al. (1975: 911) is that "the greater attraction for the cookies in the change than in the no change conditions may have resulted because subjects in the change conditions felt greater reactance as they were made explicitly aware of the threat to their freedom by the actual removal of some of their choice alternatives (cookies). Subjects in the no-change condition were not so explicitly threatened".

So for our experimental condition in which an unattainable book becomes attainable the reactance theory hypothesizes that decision freedom increases. This leads to a decrease in valuation for the originally unattainable book. So the alternative to H1 is:

H2: The books that were unattainable at first will be preferred *less* than the always attainable books. This holds for all causes of unattainability.

Complete unattainability

The hypotheses derived from commodity theory are not applicable to unattainable goods.

The reactance theory however is fairly clear with respect to an unattainable good. The elimination of a choice alternative is expected to be perceived as a decrease in the subjects' decision freedom, so the item removed is expected to increase in value and to be preferred more. So based on the reactance theory we expect:

H3: The book that is unattainable in the choice situation will be preferred to the attainable books regardless of the cause of unattainability.

Results

A general overview of the results from experiment 2 is presented in table 7. The analysis is identical to that pursued in the first experiment. The utility score for the different factor levels were determined using the conjoint measurement algorithm TRIRANK. The differences between them were tested with a χ^2-statistic.

As in experiment 1 no significant effects, except for the product

Table 7
The overall effect of non-attainability and cause of non-attainability on product preference

Factor	Factor level	Utility score	χ^2 with $df = 2$	Significance
Product	B 1	0		
	B 2	0 58	11 61	$p < 0$ 01
	B 3	0 09		
Non attainability cause				
Accidental	A [a]	−0 57		
	NA [b]	0	1 79	*n s*
	N [c]	−0 81		
Popularity	A	−0 17		
	NA	0	0 58	*n s*
	N	−0 44		
Limited supply	A	−0 25		
	NA	0	1 76	*n s*
	N	−0 76		
Popularity plus limited supply	A	−0 53		
	NA	0	1 32	*n s*
	N	−0 65		

[a] A = attainable
[b] NA = non-attainable changed in attainable
[c] N = non-attainable

factor, were found for the group as a whole. Again the analyses were repeated, separately, for the group of subjects ($N = 60$) who had rated recipe books as attractive, and for the non-attracted group ($N = 51$). The overall findings for the attractive-product group are presented in table 8.

Although this table is shown merely to present the reader with a general overview of the manipulation effects in terms of utility scores, it is evident that the pattern of scores already present in table 7 becomes more pronounced here. The book that was unattainable at first but became attainable was most preferred over all conditions. The freely attainable book came next and the completely unattainable book was least preferred.

Attainability change

The results relevant to the first hypothesis are presented in table 9.

Table 8
The overall effect of non-attainability and cause of non-attainability on the preference order of *attractive* products.

Factor	Factor level	Utility score	χ^2 with $df = 2$	Significance
Product	B 1	0		
	B 2	0.52	5.44	$p < 0.10$
	B 3	−0.01		
Non-attainability cause:				
Accidental	A [a]	−0.22		
	NA [b]	0	0.10	*n.s.*
	N [c]	−0.21		
Popularity	A	−0.77		
	NA	0	1.75	*n.s.*
	N	−1.15		
Limited supply	A	−0.57		
	NA	0	6.94	$p < 0.05$
	N	−2.44		
Popularity plus limited supply	A	−1.82		
	NA	0	5.65	$p < 0.10$
	N	−2.31		

[a] A = attainable
[b] NA = non-attainable changed in attainable
[c] N = non-attainable

Table 9
The effect of restricted attainability on product preference.

Cause of restricted attainability	Attainable vs. Attainable, but first not Attainable (χ^2 with $df = 1$)		
	Total group ($N = 111$)	Attracted group ($N = 60$)	Non-attracted group ($N = 51$)
Accidental	1.46	0.10	1.75
Popularity	0.12	1.25	0.35
Limited supply	0.28	0.98	0.29
Popularity plus limited supply	1.26	4.96 [a]	0.63
Overall ($df = 2$)	4.37	10.64 [b]	0.62

[a] $p < 0.05$
[b] $p < 0.01$

From table 9 it can be seen that the prediction from commodity theory, that the originally unattainable book is preferred to one that was always attainable, was not significantly supported when tested across all subjects. However, when only subjects attracted to the product category are considered, a strong overall effect appears. An originally unattainable book is significantly preferred ($p < 0.01$) to an always attainable one, so the hypothesis based on the commodity theory is confirmed. This is underlined by the significant difference within the 'popularity plus limited supply' condition. For these, one would expect the strongest 'hard to attain' perception and the largest difference between the originally unattainable good and an always attainable one. It is also evident that the reactance hypothesis has to be rejected. According to reactance theory (Brehm 1966) a reactance effect will only occur when the elimination of a choice alternative is perceived as threatening the subjects' decision freedom. Here the subjects were first informed they would be allowed to choose between three alternatives, and then one of the alternatives was eliminated. The absence of a reactance effect may indicate that this treatment does not induce a threat to the subjects' decision freedom. One may conclude that reactance theory is not applicable here.

Unattainability

Hypothesis 3 is tested by considering the preference for unattainable books relative to always attainable books. Table 10 shows the differences between unattainable and freely attainable books over all conditions as well as within causes of unattainability conditions.

For the group as a whole, there is no preference for freely attainable or unattainable books. For the subjects attracted to the product (recipe books) the attainable book is preferred to an unattainable one ($p < 0.01$).

This finding is contrary to the expectation stated in hypothesis 3, derived from the reactance theory. One possible explanation for this finding is that a demand characteristic is at work in the experimental setting. The subjects for whom a choice alternative was eliminated, might think that they would please the experimenter by indicating that this was not too bad, because it was the least preferred alternative that had been eliminated. But why should this effect occur only for subjects attracted to the product, and especially in the 'limited supply' condition? (In this condition the effect is significant at a 5% level.)

Table 10
The effect of non attainability on product preference

Cause of restricted non-attainability	Attainable vs not attainable (χ^2 with $df = 1$)		
	Total group ($N = 111$)	Attracted group ($N = 60$)	Non-attracted group ($N = 51$)
Accidental	0 33	0 00	0 69
Popularity	0 46	0 52	0 07
Limited supply	1 48	5 97 [a)]	2 41
Popularity plus limited supply	0 07	0 67	0 55
Overall ($df = 2$)	2 58	9 73 [b)]	3 10

[a)] $p < 0\,05$
[b)] $p < 0\,01$

If a demand characteristic caused the low preference for non-attainable books we would expect it to occur in all conditions. However, another explanation is available. Note that the preference for an unattainable book is exactly the reverse of that for an attainable book that was unattainable at first: differences in preference are only obtained for subjects attracted to the product and strongest when the cause of unattainability is limited supply. If we assume that the choice alternative eliminated would have been valued most in these conditions, then unattainability of this alternative may be perceived by these subjects as blocking a desirable choice. So here frustration may in fact be induced.

According to the frustration-aggression hypothesis (Dollard et al. 1939) this might have caused these subjects to devalue the unattainable alternative.

Discussion

Commodity theory argues for a psychological conceptualization of traditional economic variables such as supply, demand and utility. The body of research evidence to support the theoretical skeleton is however very limited. A number of questions arise in applying commodity theory, originally designed for communications, to material consumer goods.

From the experiments reported here it appears that the theory is valid only for those consumers rating the good as attractive. This might be generalized into 'the commodity theory is only valid for recipients who are involved with the product category'. Further research evidence is needed on this point. Another question has been raised as to how and to what extent information about intrinsic product attributes and price interferes with the effect of unavailability on product valuation. There may be a similarity to the price–quality relationship: we can propose the hypothesis that the strength of the effect of unavailability on product preference varies inversely with the number and type of product cues prominent in the choice situation. So the effect of scarcity is hypothesized to be strongest when no other information about the good is available. Further research is needed to test this hypothesis also.

As commodity theory restricts itself to the effects of unavailability, problems arise when deriving hypotheses from the theory with regard to unattainability. From the first part of the second experiment it appears that the hypotheses derived from the commodity theory concerned with 'effort', are applicable to restricted attainability. This raises a more general question. What behavioral mechanism, or mediating process, is involved in the explanation of the effect of unavailability and unattainability on product valuation?

Fromkin (1970) provides evidence that the value increase under restricted availability is due to an 'unicity' motive. He found the strongest effect of restricted availability on value increase in a situation of uniqueness deprivation. Fromkin also hypothesizes that other connotations of unavailability may be accentuated by arousing other motives such as 'competition' or 'social comparison'. For the subjects not attracted to the product category in experiment one, the social setting may indeed have raised an 'altruism' motive. So the situation may mediate the effect unavailability has on product preference.

The findings with regard to complete unattainability from experiment 2 suggests that complete unattainability induces frustration. At least, this may explain the reversal of the effect found there compared with the 'restricted' attainability case. These latter findings lead to the speculation that the commodity theory might be seen as a special case of a more general arousal theory.

To conclude with a general remark: the findings with respect to the effect of supply and demand characteristics on product preference suggests that the micro-economic theory of consumer demand might

gain from a behavioral approach to the supply-demand analysis with which it is concerned.

References

Aronson, E. and D. Linder, 1965. Gain and loss of esteem as determinants of interpersonal attractiveness. Journal of Experimental Social Psychology 1, 156–171.

Becker, G.S., 1965. A theory of the allocation of time. The Economic Journal 75, 493–517.

Brehm, W., 1966. A theory of psychological reactance. New York: Academic Press.

Brock, T.C., 1968. 'Implications of commodity theory for value change'. In: A G. Greenwald, T.C. Brock and T.M. Ostrom (eds.), Psychological foundations of attitudes. New York: Academic Press.

Clore, G.L., N. Hirschberg Wiggins and S. Itkin, 1975. Gain and loss in attraction: attributions from nonverbal behavior. Journal of Personality and Social Psychology 31, 706–712.

Dollard, J., L.W. Doob, N.E. Miller, O.H. Mowrer and R.R. Sears, 1939. Frustration and aggression. New Haven, CT: Yale University Press.

Fromkin, H.L., J.C. Olson, R.L. Dipboye and D. Barnaby, 1971. 'A commodity theory analysis of consumer preferences for scarce products'. In: Proceedings 79th Annual Convention APA.

Fromkin, H.L., 1970. Uniqueness deprevation and valuation of unavailable and novel experiences. In: Proceedings 78th Annual Convention APA.

Gabor, A. and C.W.J. Granger, 1966. Price as an indicator of quality: report on an enquiry. Economica 33, 43–70.

Hicks, J.R., 1959. A revision of demand theory. Oxford: Clarendon Press.

Hirsch, F., 1976. Social limits to growth. London: Harvard University Press.

Lanzetta, J.T. and V.T. Kanareff, 1962. Information cost, amount of pay off, and level of aspiration as determinants of information seeking in decision making. Behavioral Science 7, 459–473.

Leibenstein, H., 1976. Beyond economic man. London: Harvard University Press.

Olson, J.C., 1974. Cue properties of price: literature review and theoretical considerations. Working series in marketing research, No. 20. Pennsylvania State University.

Piehl, J., 1977. The effects of psychological textbooks. The Journal of Psychology 97, 275–279.

Worchel, S., J. Lee and A. Adewole, 1975. Effects of supply and demand on ratings of object value. Journal of Personality and Social Psychology 32, 906–914.